RESISTANCE OF *BETULA DAVURICA* TO THE BIRCH LEAFMINER, *FENUSA PUSILLA* (HYMENOPTERA: TENTHREDINIDAE)

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To our knowledge, reports of *Betula* spp. resistance against damage caused by the birch leafminer, *Fenusa pusilla* (Lepeletier), have not been published. Becker (1938), Friend (1933), and Johnson and Lyon (1976) stated that *B. populifolia* Marsh., *B. papyrifera* Marsh., and *B. alba* L. are the most commonly attacked species. Friend (1933) and Johnson and Lyon (1976) stated that *B. lenta* L., *B. alleghaniensis* Britt, and *B. nigra* L. have never been observed infested or are rarely fed upon.

During several growing seasons we observed much less birch leafminer damage on a single 6-year-old birch (*B. davurica* Pall. Fl. Ross.) grown from seed collected in Korea, than to nearby *Betula* spp. trees of similar age in the ornamentals nursery at the Northeast Regional Plant Introduction Station, Geneva, New York. Consistently less damage to *B. davurica* led us to suspect host resistance and undertake some study. At Geneva, in June of each year from 1978 through 1982 we estimated the extent of birch leafminer damage to *B. davurica* and *B. pendula* Roth by determining the percentage of leaves damaged on the lower branches of each tree. Trees grew 5 m apart in the same nursery row. In June 1982, in a commercial nursery at Dansville, New York, leafminer damage to *B. populifolia, B. pendula* forma *Dalecarlica* Schneid. and *B. nigra* was estimated in the same way on four trees of each species.

During the 1982 growing season, we took branch tips from *B. davurica, B. populifolia, B. nigra, B. pendula* forma *Dalecarlica* and *B. pendula*. We examined leaves under a microscope at 15× to ensure that no leafminer eggs were present. All leaves, except 2 or 3 young leaves (5 to 15 mm maximum width) per branch tip were removed and the branch tips were placed in 125 ml Erlenmeyer flasks containing water. Cotton was placed in the neck of each flask to hold branch tips upright and prevent adult leafminers from contacting the surface of the water. Leafminer adults up to 18 h old, reared from late instar larvae were confined to leaves using 10.2 cm diameter × 20.3 cm long sections of cellulose dialysis tubing as cages. The tubing was sealed to the neck of the flasks with tape and, after adults were introduced, sealed at the top by twisting. Tests were conducted throughout the summer as young leaves and leafminer adults became available. Each test consisted of 3 replications for a tree species with 6 to 9 young leaves (3 branch tips) per replicate. Test conditions were 16 h of light at 15° to 20°C, *B. populifolia* leaves were used as a susceptible standard in all tests. Normally two females were used per leaf with an equal number of males. In several tests, five or 20 females were used on *B. davurica*. *B. populifolia* and *B. davurica* were tested 5 times throughout the summer; *B. pendula* forma *Dalecarlica, B. nigra*, and *B. alba* were tested once. After adults had died (3 or 4 days after introduction) leaves were examined at 15× with transmitted light.

At Geneva, 0, 0.35, 0.75, 0.25, and 0.50% of the leaves of *B. davurica* were damaged by birch leafminer compared with 31, 48, 20, 30, and 27% of the leaves of *B. pendula* during the respective five seasons. At Dansville, averages of 64% of the leaves of *B. populifolia*, 52% of *B. pendula* forma *Dalecarlica*, and 60% of *B. nigra* were damaged. Damage to *B. davurica* was consistently less than damage to *B. pendula*. Results from Dansville indicate equal susceptibility among the three species observed. In our laboratory tests, regardless of numbers of adult females used, no eggs were deposited in *B. davurica* and no evidence of attempted oviposition was observed. The average number of eggs deposited by two females per leaf for all other species of *Betula* tested ranged from

2.3 to 17.0 per leaf. During laboratory tests adults were observed frequenting leaves of *B. davurica* as often as they did other *Betula* spp. and they remained alive equally as long. Therefore, we believe resistance is not due to toxicity or repellency. Trichome density of *B. davurica* was not enough to constitute a barrier and trichome secretions were never observed suggesting that physical barriers do not prevent oviposition.

Our field observations and laboratory tests showed that at least our specimen of *B. davurica* was highly resistant to birch leafminer damage and indicate that little or no oviposition occurred. Our tests also indicate that *B. nigra* is susceptible to leafminer damage. Apparently, reports of no infestation or rare feeding on this species are related to factors other than those studied here.

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